



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,149	07/03/2003	Takeshi Masuda	026390-00009	3313

4372 7590 09/17/2009
ARENT FOX LLP
1050 CONNECTICUT AVENUE, N.W.
SUITE 400
WASHINGTON, DC 20036

EXAMINER

ZERVIGON, RUDY

ART UNIT	PAPER NUMBER
----------	--------------

1792

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

09/17/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DCIPDocket@arentfox.com
IPMatters@arentfox.com
Patent_Mail@arentfox.com

Office Action Summary	Application No. 10/612,149	Applicant(s) MASUDA ET AL.	
	Examiner Rudy Zervigon	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 July 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-6,8-11 and 13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-6,8-11 and 13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 April 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 1, 2009 and June 2, 2009 are entered.

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 3, 4, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Okase; Wataru (US 5,884,009 A). Okase teaches a film-forming apparatus (Figure 7; column 15, lines 6-67) comprising a gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) for admixing a raw gas (75a,b; Figure 7; column 15, lines 6-67) and a reactive gas (75a,b; Figure 7; column 15, lines 6-67); a film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) connected to the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67), a circular (see perspective of Figure 6) shower head (7c; Figure 7; column 15, lines 6-67) disposed on the top face of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67); a stage (61; Figure 7; column 15, lines 6-7) for placing thereon a substrate (W; Figure 7) to be processed, the stage (61; Figure 7; column 15, lines 6-7) being disposed inside the film-forming chamber (volume within 7c+piece

containing 45; Figure 7; column 15, lines 6-67) and movable in an up and down (“lifting shaft 60”; Figure 7) manner; an exhaust port (flow path / space directly under 71; Figure 7) for discharging an exhaust gas (75a,b; Figure 7; column 15, lines 6-67) from inside the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) to outside (46,47; Figure 7) of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67), the exhaust port (flow path / space directly under 71; Figure 7) being formed though a wall surface (directly under 71; Figure 7) of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) in a position below the stage (61; Figure 7; column 15, lines 6-7) at a time of film formation, the exhaust gas generated in a space defined by the shower head (7c; Figure 7; column 15, lines 6-67) and an upper face of the stage (61; Figure 7; column 15, lines 6-7) is discharged out of the exhaust port (flow path / space directly under 71; Figure 7) through a clearance (clearance between 71 and vertical portion of 61; Figure 7) between a side wall (71; Figure 7) of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) and the stage (61; Figure 7; column 15, lines 6-7); and a gas mixture prepared in the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) being introduced into the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) through the shower head (7c; Figure 7; column 15, lines 6-67), thereby forming a film on the substrate to be processed, wherein a gas mixture supply port (outlet portion of 75a,b that interface at 7b; Figure 7) in fluid communication between the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) and the shower head (7c; Figure 7; column 15, lines 6-67) is located on a radially extending line of the shower head (7c; Figure 7; column 15, lines 6-67), and wherein the gas mixture supply port

(outlet portion of 75a,b that interface at 7b; Figure 7) is constructed and arranged such that the gas mixture to be supplied from the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) flows in a direct contact with, and from circumferentially outside (46,47; Figure 7) of, the upper surface of the shower head (7c; Figure 7; column 15, lines 6-67) toward a central portion along the upper surface of the shower head (7c; Figure 7; column 15, lines 6-67), as claimed by claim 1.

Okase further teaches:

- i. The film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1, wherein when the flow rate of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture is large, the shower conductance is small and the gas (75a,b; Figure 7; column 15, lines 6-67) mixture is injected into the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) from the central portion of the shower head (7c; Figure 7; column 15, lines 6-67) upon the formation of the film, wherein the shower head (7c; Figure 7; column 15, lines 6-67) has a relatively large diameter, that the distance between the shower head (7c; Figure 7; column 15, lines 6-67) and the substrate (W; Figure 7) to be processed is increased or that the shower head (7c; Figure 7; column 15, lines 6-67) having a the relatively large diameter is used and the distance between the shower head (7c; Figure 7; column 15, lines 6-67) and the substrate (W; Figure 7) to be processed is increased, to thus prevent the central gas (75a,b; Figure 7; column 15, lines 6-67) injection of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture and to make the manner of a gas (75a,b; Figure 7; column 15, lines 6-67) injection of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture uniform, as claimed by claim 3. The entirety of

Applicant's claim 3 is an intended use of the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

- ii. The film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1, wherein when the flow rate of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture is small, the shower conductance is large and the gas (75a,b; Figure 7; column 15, lines 6-67) mixture is injected into the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) from the shower head (7c; Figure 7; column 15, lines 6-67) and into a region above the substrate (W; Figure 7) to be processed from the periphery of the shower head (7c; Figure 7; column 15, lines 6-67) upon the formation of the film, wherein the shower head (7c; Figure 7; column 15, lines 6-67) has a relatively small diameter, that the distance between the shower head (7c; Figure 7; column 15, lines 6-67) and the substrate (W; Figure 7) to be processed is reduced or that the shower head (7c; Figure 7; column 15, lines 6-67) having the relatively small diameter is used and the distance between the shower head (7c; Figure 7; column 15, lines 6-67) and the substrate (W; Figure 7) to be processed is reduced, to thus prevent the peripheral gas (75a,b; Figure 7; column 15, lines 6-67) injection of the gas

(75a,b; Figure 7; column 15, lines 6-67) mixture and to make the manner of the gas (75a,b; Figure 7; column 15, lines 6-67) injection of the gas (75a,b; Figure 7; column 15, lines 6-67) mixture uniform, as claimed by claim 4. The entirety of Applicant's claim 4 is an intended use of the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

- iii. The film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1, wherein a gas ring (76; Figure 7; column 14; lines 30-45) is disposed at a periphery of the top face of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) so that an inert gas (77; Figure 7; column 15, lines 6-67), which is not directly involved in the film formation, can uniformly be introduced into the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) through the gas ring (76; Figure 7; column 14; lines 30-45) and along the inner surface of the side wall of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67), as claimed by claim 11

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 5, 6, 8, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okase; Wataru (US 5,884,009 A). Okase does not teach the relative dimensions of Okase's showerhead (7c; Figure 7; column 15, lines 6-67) diameter vs. Okase's film forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) diameter as claimed by claims 5. Okase does not teach the relative distance between Okase's substrate (W) and Okase's showerhead (7c; Figure 7; column 15, lines 6-67). Okase further does not teach the operating parameters of pressure and gas flow in the range of the claimed inequalities – claim 6, and 8-10. It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize Okase's relative apparatus dimensions and Okase's operating parameters.

Motivation to optimize Okase's relative apparatus dimensions and Okase's operating parameters is for generating uniform thickness of deposited films as taught by Okase (column 13, lines 20-30). Further, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (*In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05). Further it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art. (*Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Rose*, 220 F.2d 459, 105 USPQ

237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04)

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okase; Wataru (US 5,884,009 A) in view of Reimer; Paul et al. (US 6817377 B1). Okase is discussed above.

Okase further teaches:

an exhaust port (flow path / space directly under 71; Figure 7) for discharging an exhaust gas (75a,b; Figure 7; column 15, lines 6-67) from inside the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) to outside (46,47; Figure 7) of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) is formed though a wall surface (directly under 71; Figure 7) of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) in a position below the stage (61; Figure 7; column 15, lines 6-7) at a time of film formation, the exhaust gas generated in a space defined by the shower head (7c; Figure 7; column 15, lines 6-67) (7c; Figure 7; column 15, lines 6-67) and an upper face of the stage (61; Figure 7; column 15, lines 6-7) is discharged out of the exhaust port (flow path / space directly under 71; Figure 7) through a clearance (clearance between 71 and vertical portion of 61; Figure 7) between a side wall (71; Figure 7) of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) and the stage (61; Figure 7; column 15, lines 6-7); wherein a gas mixture supply port (outlet portion of 75a,b that interface at 7b; Figure 7) is constructed and arranged such that the gas mixture to be supplied from the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) flows in a direct contact with, and from circumferentially outside (46,47; Figure 7) of, the upper surface of

the shower head (7c; Figure 7; column 15, lines 6-67) toward a central portion along the upper surface of the shower head (7c; Figure 7; column 15, lines 6-67), as claimed by claim 13

Okase does not teach a film-forming apparatus (Figure 7; column 15, lines 6-67), which comprises a load-lock chamber for stocking wafers conveyed from a wafer cassette in the atmospheric conditions; a film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67); a conveyer chamber positioned between the load-lock chamber and the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) - claim 13.

Reimer teaches semiconductor processing apparatus (Figure 1) including a load-lock chamber (25c) for stocking wafers conveyed from a wafer cassette in the atmospheric conditions; a film-forming chamber (25a); a conveyer chamber (25b) positioned between the load-lock chamber (25c) and the film-forming chamber (25a).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Reimer's load-lock chamber (25c) and conveyer chamber (25b) to Okase's apparatus.

Motivation to add Reimer's load-lock chamber (25c) and conveyer chamber (25b) to Okase's apparatus is for process automation as taught by Reimer (column 1; lines 10-13).

Response to Arguments

6. Applicant's arguments filed June 2, 2009 have been fully considered but they are not persuasive.

7. Applicant states:

“

With regards to Okase, Applicants note the Office Action asserts the position that Okase teaches a supply port (any of 75 a, b) which supplies a gas mixture from a gas-mixing chamber (defined by the Office Action as the volume between 7a, b) to the shower head (7c) is defined only by an outer peripheral surface (portion of 75a, b) of the gas-mixing chamber (volume between 7a, b) and an inner surface (portion of 75a b) of the film-forming apparatus.

As such, Applicants submit the gas mixture supply port taught by Okase is not located on a radially extending line of the shower head (7c) since, as characterized by the Office Action, the gas mixture supply port (and of 75 a, b) is separate from and located above the shower head (7c) and is nowhere near being located on a radially extending line of the shower head (7c).

“

In response, the Examiner notes that Applicant's arguments are based on Applicant's amendment that significantly alters the scope of the claims. As a result, the Examiner's changes to his grounds of rejection, as necessitated by said amendment addresses Applicant's arguments. In particular, Okase is again applied as teaching “a gas mixture supply port (outlet portion of 75a,b that interface at 7b; Figure 7) in fluid communication between the gas-mixing chamber (volume between 7a,b; Figure 7; column 15, lines 6-67) and the shower head (7c; Figure 7; column 15, lines 6-67) is located on a radially extending line of the shower head (7c; Figure 7; column 15, lines 6-67)”. Additional amended features are addressed in the body of the Examiner's new grounds of rejection.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1792 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

/Rudy Zervigon/

Primary Examiner, Art Unit 1792